What is claimed is:

1. Low expansion transparent glass-ceramics obtained by heat treating a base glass produced at a melting temperature of 1530℃ or below, said glass-ceramics having an average linear thermal expansion coefficient (α) within a range from $+6\times10^{-7}$/℃ to $+35\times10^{-7}$/℃ within a temperature range from 100℃ to 300℃ and having 80% transmittance wavelength (T_{80}) of 700nm or below.

2. Low expansion transparent glass-ceramics as defined in claim 1 wherein internal transmittance for a plate having thickness of 10mm is 75% or over at light wavelength of 1550nm.

3. Low expansion transparent glass-ceramics as defined in claim 1 having a heat resisting temperature of 800℃ or over.

4. Low expansion transparent glass-ceramics as defined in claim 1 having Young's modulus of 90 GPa or over.

5. Low expansion transparent glass-ceramics as defined in claim 1 containing β-quartz or β-quartz solid solution as a predominant crystal phase.

6. Low expansion transparent glass-ceramics as defined in claim 1 containing 1.5% - 3.5% Li_2O in mass % on the basis of amount of total oxides.

7. Low expansion transparent glass-ceramics as defined in claim 1 wherein amount of eluting lithium ion is less than 0.0050 μ g/cm^2

8. Low expansion transparent glass-ceramics as defined in claim 1 containing 3% - 6% TiO_2 in mass % on the basis of amount of total oxides.

9. Low expansion transparent glass-ceramics as defined in claim 1 containing three or more ingredients among RO ingredients (where R is Mg, Ca, Sr, Ba or Zn) in an amount of 0.5% or over in mass % on the basis of amount of total oxides for respective ingredients.

10. Low expansion transparent glass-ceramics as defined in claim 9 containing ZnO in a larger amount than other RO ingredients in mass % on the basis of amount of total oxides.

11. Low expansion transparent glass-ceramics as defined in claim 9 containing a total amount of the RO ingredients of 3.5% or over in mass % on the basis of amount of total oxides.

12. Low expansion transparent glass-ceramics as defined in claim 1 containing a total amount of R'O ingredients (where R' is Mg, Ca, Ba or Sr) of 3% - 13% in mass % on the basis of amount of total oxides.

13. Low expansion transparent glass-ceramics as defined in claim 1 comprising in mass % on the basis of amount of total oxides:

SiO_2	50 - 65%
Al_2O_3	20 - 30%
MgO	0.5 - 2%
CaO	0.5 - 2%
SrO	0 - 10%
BaO	1 - 5%
ZnO	0.5 - 15%

Li_2O	1.5 - 3.5%
TiO_2	3 - 6%
ZrO_2	1 - 5%
Nb_2O_5	0 - 5%
La_2O_3	0 - 5%
Y_2O_3	0 - 5%
As_2O_3 and/or Sb_2O_3	0 - 2%.

14. Low expansion transparent glass-ceramics wherein an average linear thermal expansion coefficient (α) is within a range from $+6\times10^{-7}$/℃ to $+35\times10^{-7}$/℃ within a temperature range from 100℃ to 300℃ and internal transmittance for a plate having thickness of 10mm is 75% or over at light wavelength of 1550nm.

15. Low expansion transparent glass-ceramics as defined in claim 14 produced by heat treating a base glass at a melting temperature of 1530℃ or below.

16. Low expansion transparent glass-ceramics as defined in claim 14 having 80% transmittance wavelength (T_{80}) of 700nm or below.

17. Low expansion transparent glass-ceramics as defined in claim 14 having a heat resisting temperature of 800℃ or over.

18. Low expansion transparent glass-ceramics as defined in claim 14 having Young's modulus of 90 GPa or over.

19. Low expansion transparent glass-ceramics as defined in claim 14 containing β -quartz or β -quartz solid solution as a predominant crystal phase.

20. Low expansion transparent glass-ceramics as defined in claim 14 containing 1.5% - 3.5% Li_2O in mass % on the basis of amount of total oxides.

21. Low expansion transparent glass-ceramics as defined in claim 14 wherein amount of eluting lithium ion is less than 0.0050 μ g/cm^2.

22. Low expansion transparent glass-ceramics as defined in claim 14 containing 3% - 6% TiO_2 in mass % on the basis of amount of total oxides.

23. Low expansion transparent glass-ceramics as defined in claim 14 containing three or more ingredients among RO ingredients (where R is Mg, Ca, Sr, Ba or Zn) in an amount of 0.5% or over in mass % on the basis of amount of total oxides for respective ingredients.

24. Low expansion transparent glass-ceramics as defined in claim 23 containing ZnO in a larger amount than other RO ingredients in mass % on the basis of amount of total oxides.

25. Low expansion transparent glass-ceramics as defined in claim 23 containing a total amount of the RO ingredients of 3.5% or over in mass % on the basis of amount of total oxides.

26. Low expansion transparent glass-ceramics as defined in claim 14 containing a total amount of R'O ingredients (where R' is Mg, Ca, Ba or Sr) of 3% - 13% in mass % on the basis of amount of total oxides.

27. Low expansion transparent glass-ceramics as defined in claim 14 comprising in mass % on the basis of amount of total oxides:

SiO_2	50 - 65%
Al_2O_3	20 - 30%
MgO	0.5 - 2%
CaO	0.5 - 2%
SrO	0 - 10%
BaO	1 - 5%
ZnO	0.5 - 15%
Li_2O	1.5 - 3.5%
TiO_2	3 - 6%
ZrO_2	1 - 5%
Nb_2O_5	0 - 5%
La_2O_3	0 - 5%
Y_2O_3	0 - 5%
As_2O_3 and/or Sb_2O_3	0 - 2%.

28. Low expansion transparent glass-ceramics comprising in mass % on the basis of amount of total oxides:

SiO_2	50 - 65%
Al_2O_3	20 - 30%
MgO	0.5 - 2%
CaO	0.5 - 2%
SrO	0 - 10%
BaO	1 - 5%
ZnO	0.5 - 15%
Li_2O	1.5 - 3.5%
TiO_2	3 - 6%
ZrO_2	1 - 5%
Nb_2O_5	0 - 5%
La_2O_3	0 - 5%

Y_2O_3	0 - 5%
As_2O_3 and/or Sb_2O_3	0 - 2%.

29. A method for manufacturing glass-ceramics comprising steps of:

melting glass materials comprising in mass % on the basis of amount of total oxides:

SiO_2	50 - 65%
Al_2O_3	20 - 30%
MgO	0.5 - 2%
CaO	0.5 - 2%
SrO	0 - 10%
BaO	1 - 5%
ZnO	0.5 - 15%
Li_2O	1.5 - 3.5%
TiO_2	3 - 6%
ZrO_2	1 - 5%
Nb_2O_5	0 - 5%
La_2O_3	0 - 5%
Y_2O_3	0 - 5%
As_2O_3 and/or Sb_2O_3	0 - 2%

at a melting temperature of 1530℃ or below;

cooling molten glass materials to provide a base glass; and

heat treating the base glass to cause β-quartz crystal or β-quartz solid solution crystal to precipitate.

30. A glass-ceramic substrate consisting of the low expansion transparent glass-ceramics as defined in claim 1.

31. An optical waveguide element comprising the glass-ceramic substrate as

defined in claim 30, a core and a clad provided on the glass-ceramic substrate, said clad having a smaller refractive index than said core.

32. An optical waveguide element comprising the glass-ceramic substrate as defined in claim 30, a SiO_2-GeO_2 core provided on the glass-ceramic substrate and a SiO_2 clad covering said core.

33. An optical waveguide element as defined in claim 31 wherein said clad comprises a lower clad and an upper clad and said lower clad is provided on the substrate and the core and the upper clad are provided on the lower clad.

34. An optical waveguide element as defined in claim 31 wherein said core is provided as an arrayed waveguide grating (AWG), a pair of slab waveguides and a plurality of input and output waveguides and functions as an optical multiplexing and demultiplexing circuit.

35. A method for manufacturing an optical waveguide element comprising steps of forming a core on the glass-ceramic substrate as defined in claim 30 by reactive ion etching (RIE) and then forming a clad covering the core.

36. A method for manufacturing an optical waveguide element as defined in claim 35 wherein said core is a SiO_2-GeO_2 core and said clad is a SiO_2 clad.

37. A method for manufacturing an optical waveguide element as defined in claim 35 wherein a core film is formed on the substrate by chemical vapor deposition (CVD) and thereafter said core is formed by reactive ion etching (RIE).

38. A method for manufacturing an optical waveguide element as defined in

claims 35 wherein a lower clad and a core film are formed on the substrate by chemical vapor deposition (CVD) and thereafter said core is formed by reactive ion etching (RIE).

39. A method for manufacturing an optical waveguide element as defined in claim 35 wherein SiO_2-GeO_2 glass particles are deposited on the substrate by flame hydrolysis deposition (FHD) to form a SiO_2-GeO_2 core film, said core film is made transparent by heating and thereafter said core is formed in the form of a waveguide pattern by reactive ion etching (RIE) and a SiO_2 upper clad covering the core is formed by flame hydrolysis deposition (FHD).

40. A method for manufacturing an optical waveguide element as defined in claim 35 wherein SiO_2 glass particles and SiO_2-GeO_2 glass particles are deposited on the substrate by flame hydrolysis deposition (FHD) to form a SiO_2 lower clad film and a SiO_2-GeO_2 core film, said lower clad film and said core film are made transparent by heating and thereafter said core is formed in the form of a waveguide pattern by reactive ion etching (RIE) and a SiO_2 upper clad covering the core is formed by flame hydrolysis deposition (FHD).

41. An optical waveguide comprising a core made in the form of a waveguide pattern and a clad covering the core provided on a glass-ceramic substrate made of glass-ceramics as defined in claim 14, said clad having a smaller refractive index than said core.

42. An optical waveguide element as defined in claim 41 wherein said glass-ceramics have 80% transmittance wavelength (T_{80}) of 700nm or below, have heat resisting temperature of 800℃ or over, and have Young's modulus of 90 GPa or over.